CHAPTER 19 – RISK MANAGEMENT

Contents

Introduction 2
Risk Management Plan 5
Elements of a Risk Management Plan 6
Risk Elements and Assessment 9
Interpreting the Graded Approach Total Risk Score 12
References 15
Caltrans Method for Risk Analysis 16

Introduction

Project risk management is the systematic process of identifying, analyzing, planning for, responding to and monitoring project risk. It involves processes, tools and techniques that will help the Project Manager minimize the probability and consequences of adverse events. Risk management is most effective when first performed early in the life of a project and is a continuing responsibility throughout the project.

Project risk is an uncertain event or condition that, if it occurs, will have an effect on project success. Project success is defined as meeting the goals of project. The four critical goals of every project include: objectives, schedule, budget, and quality.

In addition to the four goals listed above, consultant Project Managers must also be concerned with those risks that will affect profitability and liability of the firm.

Risks that have a positive outcome are opportunities while risks with a negative outcome are threats. The Project Manager is responsible to identify and manage all risks; increasing the probability and/or impact of opportunities (i.e. positive risk events) and minimizing the probability and/or impact of threats (i.e. negative risk events). Figure 1, **Three Components of Risk**, illustrates the elements associated with all risk.

Project opportunities are uncertain events that, if they occur, will have a positive

Figure 1
Three Components of Risk

effect on project success. Opportunities do occur during projects and Project Managers must be prepared to capitalize on them. This chapter will concentrate on threats (i.e. negative risks), but the management processes described may also identify opportunities.

Project risk is the combination of probability and impact. Probability describes the likelihood of an event or condition actually occurring on a project and is expressed as a percent (e.g, 40% probability of this risk occurring). Impact describes the consequence of the event or condition occurring and is expressed in dollars (e.g., if this risk does occur it will cost us $100,000). Risk management must consider both. The risk of a major financial crisis within the state, shutting down a project would have a major impact on the project, but is a very unlikely event. Although the risk of a missed deadline for a specific task may be great, the impact may not be very severe if the time can be easily made up. In both of these cases, the overall risk may be acceptable.

There are many procedures and tools available for risk management. This chapter will describe three processes: the Risk Based Graded Approach, Caltrans Method for Risk Analysis and the Project Risk Register.

Risk Based Graded Approach is a process to define, in rough terms, the overall risk value of the project. It should be used by the FDOT Project Manager during the initial scoping phase of the project to assess overall project risk.

Another alternative method for Project Risk Management is the Caltrans Method for Risk Analysis. This process was developed by the California Department of Transportation and specifically designed for transportation projects. The Caltrans Method is presented at the end of this chapter.

The Project Risk Register is a formal risk analysis involving input from both internal and external stakeholders. The Project Risk Register should typically be used on only the most complicated, riskiest FDOT projects. The Project Risk Register allows the Project Manager and project team to determine what is the probability and impact for identified risks. From this the risks can be prioritized using expected monetary value and displayed on the “Probability – Impact Matrix”. This matrix would be a major deliverable and a strong communication

tool that focuses everyone on the prioritized risks (i.e. the high:high risk cells). The Project Risk Register should be completed by FDOT and the consultant after the consultant selected for the project is under contract. It will likely be necessary to adjust the scope of work to accommodate the results of the risk analysis.

Although this chapter deals specifically with the project manager's responsibilities with risk management processes, other chapters in this Project Manager's Handbook describe common sense risk management steps and practices. The following chapters in Part I of the handbook present specific recommendations that will help manage risks, with or without a formal risk management plan:

- Chapter 3, Project Work Plan
- Chapter 4, Monitoring and Control
- Chapter 7, Responsibilities and Roles of Project Managers
- Chapter 11, Project Continuity
- Chapter 15, Scheduling
- Chapter 16, Quality Assurance and Quality Control

Risk Management Plan

A risk management plan should identify the risks that need to be managed (the highest priority risks and possibly some or all of the intermediate priority risks) and the selected risk response strategy for each. The plan should include specific actions to be taken and responsible parties. The risk management plan should become part of the Project Work Plan, as discussed in Part I, Chapter 3 of this handbook. A new risk management plan should be developed at the initiation of each project phase, involving the FDOT Project Managers of the preceding, current and subsequent phase. Plans should be developed early enough to include necessary strategies in the consultant scope of services. A risk management plan will also be a valuable tool in selecting design-build and other innovative contracting methods for construction contracts.

It is a good idea for both the FDOT and consultant Project Managers to develop separate risk management analyses from their own perspectives as part of their preparations for contract negotiations. Managing high-priority risks are valid interests that should be addressed by both parties as part of mutual gains negotiations. The analyses should then be updated after negotiations reflecting any agreements reached.

Plans should be monitored to identify new risks and to ensure that selected strategies are executed and the effectiveness of actions taken are evaluated. Monitoring of the plan should continue throughout the life of a project. Detailed updates of the plan should be made at selected milestones, especially on large projects.

The ***Project Manager's Toolbox*** contains a risk-based "graded approach analysis" methodology, used to determine requirements for planning and control of the project work effort. This procedure results in an overall risk evaluation for a project, as well as identification of general risk elements within a project. It is a simplified approach to risk analysis.

Elements of a Risk Management Plan

Risk Identification. The first step in Risk Management is identification of potential risks to a project. Risk identification involves identifying potential project risks and documenting their characteristics, resulting in a list of potential project risks. As a starting point in the process, potential project risks are listed in Figure 2, **Types of Risk**. This list should be supplemented based on the experience of the Project Manager and other team members, as well as historical data available from similar projects, studies performed by the District or the Central Office on similar projects and other appropriate sources. The actual list for each project should be unique, reflecting specific project conditions. This list should include those situations and conditions that have a reasonable likelihood of occurring and that will have some negative impact on the project. It is not necessary to list those that are only technically possible or those that will have a very minor impact on the project. Otherwise, probability and impact should not be a consideration at this point.

Developing this list is a creative process. It is helpful if the project manager involves the key members of the project team in this task. FDOT project managers should also involve Project Managers from the preceding and following phases in identifying potential risks. The list of potential risks should include everything that can go wrong on a project. It will vary according to the project phase (PD&E, Design, etc.), type of project (3R, capacity improvement, etc.), whether the list is being compiled by FDOT or a consultant Project Manager, and specific project conditions.

On complicated projects where use of a formal risk analysis process is required (e.g. the Project Risk Register), the FDOT Project Manager will involve the key members of the project team in this task. In general the key members should include the Project Manager, sponsor, customer, external stakeholders, and a representative from engineering, procurement, quality, HR, safety, finance, and operations and maintenance. FDOT Project Managers should also involve Project Managers from the preceding and following phases in identifying potential risks.

Figure 2
Types of Risk

TECHNICAL RISKS

- Preceding phase project deliverables are incomplete
- Preceding phase reports/ plans are in error
- Right of way studies are not accurate
- Environmental analysis is incomplete or in error
- Unexpected geological issues
- Inaccurate design assumptions in PD&E Report
- Surveys are late or are in error
- Geotechnical reports in error
- Hazardous waste analysis incomplete or in error
- Need for design variations or exceptions
- Context sensitive solutions create design delays

EXTERNAL RISKS

- Right of way delays as a result of court actions
- Changed priorities
- Local communities or groups pose objections
- Funding changes
- Political factors change
- Stakeholders request late changes
- New stakeholders emerge with new demands
- Influential interests raise objections
- Lawsuits to halt or change the project
- Pressure to choose time over costs or quality
- Delays in agreements with local agencies, railroads, etc.
- Utility relocation delays
- Permitting issues

ENVIRONMENTAL RISKS

- Delays in permit approval
- Changed requirements for permits
- Changes in environmental regulations
- Reviewing agencies require higher-level review than expected
- Lack of specialized staff to perform environmental analysis
- Unidentified special-interest sites discovered (historical, endangered species, etc.)
- Environmental class of action changes
- Public controversy arises over environmental issues
- Change in alignment requires new environmental analysis
- Section 4(f) lands become involved
- Pressure to compress the schedule for environmental analysis

ORGANIZATIONAL RISKS

- Inexperienced staff assigned
- Lack of staff assigned to the project
- Loss of critical staff at critical point in project
- Insufficient time to plan project
- Unanticipated Project Manager workload
- Delays getting approvals and decisions
- Support units unavailable or overloaded
- Changed priorities
- Project under funded
- Inconsistent project goals (objectives, schedule, budget and quality)

PROJECT MANAGEMENT RISKS

- Project need and purpose poorly defined
- Project scope is poorly defined or incomplete
- Selection of a poor consultant or subconsultants
- Selection of a poor contractor
- Project Manager does not have control over staff priorities
- Too many projects
- Estimating and/or scheduling errors
- Poor communication within the team
- Unrealistic schedule
- Changed schedule
- Lack of coordination among support units
- Lack of management support
- Changes in key staff members

PROJECT MANAGEMENT RISKS

Many of the above issues will apply to the consultant as well, however consultant Project Managers must also address risk as it applies to profitability. Some unique risks for a consultant Project Manager may include:

- Incomplete or inaccurate scope of services
- Scope creep
- Unrealistic budget
- Unrealistic schedule
- Inappropriate, unnecessary or conflicting comments on FDOT reviews
- Late comments on submittals
- Unexpected rise in firm overhead
- Unresponsive subconsultant(s)
- Assessment of errors and omissions claims
- Change in FDOT Project Manager

Qualitative Risk Analysis: The next step in the risk management process is to qualify and prioritize the identified risks. This process involves considering probability and impact separately, then prioritizing the risks using a combination of both. Careful and objective definitions of the levels of probability and consequences, or impact, are critical to the creditability of the process.

A Risk Based Graded Approach Analysis is used during project scoping by the FDOT Project Manager to determine requirements for planning and control of the project work effort. This analysis will maximize project control effectiveness at the lowest cost and assist in identification and mitigation of project risks.

The Risk Based Graded Approach Analysis is a management tool used to:

- Determine where to assign what PM resources
- Helps define the scope for the Project
- Evaluate risk elements based on risk (vs. cost of project)
- Get agreement from all members of the project team

The Risk Based Graded Approach Worksheet should take no more than fifteen minutes to complete, even on the most complex project. The worksheet is completed as part of the project planning process with the total Risk Score included in the project documentation. Completion of the Risk Based Graded Approach Worksheet is a fast way to quantify project risk early in the project timeline and should not be used as a substitute for formal risk identification, qualification, quantification, and response planning. Figure 3, **Risk Based Graded Approach Definitions**, will help clarify some terminology.

Figure 3
Risk Based Graded Approach Definitions

Graded Approach	Risk Based Graded Approach
A flexible selection process that allows the project manager to choose a more or less rigorous application of project control elements. This flexibility permits customizing project control needs to the specific project and focus's the team efforts on the higher risk elements (i.e.,"the 5 – 5's").	A Risk Based Graded Approach Worksheet identifies and documents values for predetermined risk elements. Identification of a total risk score denotes the probability of any potential impacts on project deliverables cost / schedule baselines during project execution. Identification of project risk qualifies the possibility of baseline impacts (e.g., not meeting intended technical functions, internal or external schedule commitments, cost thresholds, et al).

Risk Elements and Assessment

Refer to Figure 4, **15 Risk Elements**.

There are numerous risk areas that may typically be encountered on an FDOT project, 15 of the more critical risk elements are listed on the following pages. The risk areas are not cast in stone and may be eliminated, or new risks added, to match the characteristics of a specific project. For example, risk element 5, environmental impacts/contamination, could be eliminated if there were no chance of impacts or contamination on the project.

Risk Assessment: The Risk Assessment value is determined by the project team and documented on the graded approach worksheet. The below-listed numeric guidelines can be used to guide the team members in determining the overall level of risk, per element, to project priorities (i.e., scope, schedule, cost, and, quality). Risk assessment values are as follows:

The project team assigns each risk element a risk assessment value based on the anticipated risk level. Note, although typically there is a distribution of 1, 3, and 5's within this column, all risk assessments may be "1" or all "5". This is dependent on the input from the team.

Risk Priority: Next, the project team next identifies where they will apply priorities within the identified risk elements. The team determines where the maximum number of three "5's" (i.e., highest priority) are to be assigned and scores the balance of the risk elements with either a "3" (medium priority) or "1" (low priority). The three high risk elements should be identified first.

Total Risk Score: The Total Risk Score is calculated by multiplying the scores in the risk assessment column times the priority scores for a total per risk element. The risk element scores are then summed to determine a Total Risk Score.

Figure 4
15 Risk Elements

Risk Element	1 - Low Risk	2 - Medium Risk	3 - High Risk
1. **Utility Involvement** - Level of utility involvement on the project	None or very little impact, no relocations	Small number of utilities in the corridor with minor adjustments and few relocations	Multiple utilities with major relocations
2. **Project Schedule** - How much time the project team has to complete the project	Everyone has as much time as they want.	Schedule is somewhat compressed.	Schedule is very compressed or very critical.
3. **Interfaces** - Number of organizations/stakeholders involved in the planning and/or execution	One to three	Four to seven	More than seven
4. **Experience/Capability** - Level of experience and capability of project team members	Project loaded with highly experienced senior staff	Blend of highly experienced senior staff and inexperienced personnel	Project loaded with inexperienced staff
5. **Right of Way (ROW) Involvement** - Level of right of way acquisition involved	No new ROW required	Minor ROW required, such as corner clips	Major ROW acquisition with redesigns for curves
6. **Environmental Impacts/Contamination** - Level of environmental impact or contamination encountered	None or minor environmental impacts; contamination fully characterized and acceptable	Major, but routine impacts that are readily permitted; contamination partially characterized and results indeterminate	Extensive major impacts that are difficult to permit and will cause delay; contaminations expected, extent unknown or unacceptable characterization
7. **Regulatory Involvement** - Degree to which governmental or other regulatory agencies impact project	None or minor involvement	Somewhat involved	Regular contact and/or visits

Figure 4
15 Risk Elements (continued)

Risk Element	1 - Low Risk	2 - Medium Risk	3 - High Risk
8. **Contractor Issues** - Degree of complexity expected (e.g. long lead times, contractor qualification and reliability)	Minor or non-existent issues	Contractor issues will occur on regular basis, but will be manageable	Contractor issues may result in significant delays and/or cost overruns.
9. **Resource & Material Availability** - Availability of internal and external resources or materials to plan and execute the project	Resources and materials readily available	Resources and materials are somewhat restricted	Project will be resource or material constrained, impacting schedule and cost.
10. **Project Funding** - Availability and approval status of project planning and execution funding	Single source and approved	Multiple sources and approved	Significant chance funding may be cut or may be inadequate to continue the project
11. **Political Visibility** - Level of political exposure the project has to elected officials	None, just get it done	Somewhat visible - provide occasional updates or receive occasional phone calls from elected officials	Highly visible - scheduled visits by and frequent updates to elected officials or their designated staff
12. **Public Involvement** - How much the public is involved in the project	None, just get it done; public strongly behind the project with little opposition	Somewhat involved - issue news releases as required; some opposition, but not very organized	Very involved - part of the project scope, schedule and cost, and quality decisions may be impacted by public involvement; strong, well organized, vocal public opposition
13. **Safety** - The safety issues the team will encounter	Standard safety considerations	Increased diligence due to location, product weight or configuration, or type of work (e.g. high voltage)	Very restrictive safety considerations (e.g. caustic environment, hot-taps, etc.)
14. **Construction Complexity** - Degree of complexity expected when combining technology, scope of work, maintenance of traffic, and schedule	Routine day construction with limited night work; rural environment	Major construction in urban or suburban areas; right of way width does not constrain contactor operations	New construction techniques; multiple phased project with complex maintenance of traffic, tight right of way constrains contractor operations; urban environment
15. **Weather Sensitivity** - How weather conditions, major events (e.g. hurricanes) and time of year would impact project schedule	No impact by normal weather or by a major event	Little impact by normal weather with some impact by a major event	Major impact by normal weather disruption or major event; time of year significantly constrains progress (e.g. photography difficult to obtain due to cloud cover)

Interpreting the Graded Approach Total Risk Score

There are two values to look at:

- The total risk score – where it fits into specified ranges to determine if the project is low, medium, or high risk.
    - Total Risk Score = < 90 Low Risk Project
    - Total Risk Score = 90 – 150 Medium Risk Project
    - Total Risk Score = > 150 High Risk Project
    - **Note:** these scores are based on **15** risk elements included in the analysis. Prorate the scores based on the number of elements used.
- If there are any "5 – 5's" (i.e., when there is a 5 in the risk assessment and risk priority columns for a single risk element) it signifies a risk element that should be focused on by the team and used to determine the makeup of the team members. For example, if you have a "5 – 5" in project schedule you will want to have a schedule focused leader. If the "5 – 5" is in Technology you will want to have more of an engineering focus. The project team should also review moderate risk elements receiving scores of "3-5" or "5-3" to determine actions that can be taken to reduce, mitigate or plan for the risk.

Sample Risk Based Graded Approach Worksheet: A "sample" graded approach worksheet is provided in Figure 5**, Risk Based Graded Approach Worksheet**. Risk elements project schedule and right of way involvement are rated as "5-5". Overall, the total project score is 137 and is considered a medium risk project.

Figure 5
Risk Based Graded Approach Worksheet

ITEM	RISK ELEMENT	RISK ASSESSMENT	PRIORITY	TOTAL
1	Utility Involvement	1	3	3
2	Project Schedule	5	5	25
3	Interfaces	3	1	3
4	Experience/Capability	3	3	9
5	Right-of-Way Involvement	5	5	25
6	Environmental Impacts/Contamination	1	1	1
7	Regulatory Involvement	3	3	9
8	Contractor Issues	5	3	15
9	Resource and Material Availability	3	3	9
10	Project Funding	1	1	1
11	Political Visibility	3	5	15
12	Public Involvement	3	3	9
13	Safety	3	3	9
14	Construction Complexity	1	1	1
15	Weather Sensitivity	3	1	3
			Risk Score	137

Low Risk	0 - 90
Medium Risk	90 - 150
High Risk	>150

Quantitative Risk Analysis: Once potential project risks have been prioritized through the Qualitative Risk Analysis process described above, the effect of those risks on the project can be quantified. The Quantitative Risk Analysis process analyzes the effect of the prioritized risk events and assigns a numerical rating to those risks. The quantification of risks involves assigning a cost in dollars of impact should the risk occur and a probability of the risk occurring.

The purpose of risk quantification is to:

- Quantify possible outcomes for the project and their probabilities
- Assess the probability of achieving specific project objectives
- Identify risks requiring the most attention by quantifying their relative contribution to overall project risk
- Identify realistic and achievable cost, schedule, or scope targets, given the project risks
- Determine the best project management decisions when some conditions or outcomes are uncertain

(reference Project Managers Book of Knowledge (PMBOK) Guide – Third Edition; p 254)

There are several techniques for quantifying risks including interviewing stakeholders to determine probabilities and impacts, sensitivity analysis, decision tree analysis, and simulation (i.e. Monte Carlo technique). Discussion on these techniques and tools can be found in project management publications and books such as the PMBOK Guide – Third Edition.

An example of a quantitative risk analysis could involve an urban widening project that is highly controversial. The FDOT project manager expects there to be considerable public opposition. One public meeting is scheduled to occur during the Phase III design. The project team assesses there is a 60% chance that the opponents to the project could cause a significant redesign during Phase III and that the cost of the redesign would be $400,000 plus a significant delay in the project schedule. The team determined that the risk could be mitigated through an aggressive public involvement program involving additional public meetings, meetings with elected officials, meetings with other public interest groups, and the preparation of high end tools such as a fly-through. The cost of the additional public involvement activities is $100,000. The project teams expects the aggressive public involvement effort will reduce the likelihood of the opponents causing a significant redesign and associated delay from 60% to 20%. The risk value is reduced by $160,000 ($400,000 x (60%-20%)). In this case, it would be appropriate for the Department to undertake the aggressive public involvement program. The costs associated with the Departments aggressive public involvement program can be included in the cost baseline as the project migrates through the planning process.

Risk Response. Risk response planning should focus initially on the high priority risks (the example identifies project schedule and right of way Involvement as high priorities). The intermediate priority risks (contractor issues and political visibility) can be addressed as time and resources permit. Low priority risks are usually considered acceptable risks and are not usually addressed in a risk response plan.

A risk response plan should assign one of the following strategies to each risk considered.

- **Avoid the Risk:** The Project Manager recommends changing the project plan (scope, project work plan and/or consultant contract) to eliminate the risk or protect the project from its impact. Possible actions include changing the scope, adding time or adding funds.
- **Transfer the Risk:** Change the scope of a proposed or existing contract to transfer the risk to a consultant, contractor, or insurance company. For example, if the original plan was for the FDOT to perform geotechnical investigations but the risk of project overload in that group is high then it could be added to a consultant contract. There will almost always be a cost associated with a transferred risk.

- **Mitigate the Risk:** Reduce the probability and/or impact of a risk to an acceptable level. For instance, a public relations consultant might be assigned to mitigate a high priority risk of public controversy on an upcoming major construction project. Mitigation steps, although almost always costly and time-consuming, may still be preferable to going forward with an unmitigated risk.
  - **Accept the Risk:** The best decision may be to accept certain risks. This strategy includes recognizing the potential risk and the need to address it if it occurs and possibly developing a contingency plan for that event.
  - **Select a Strategy:** The best strategy is a function of the cost associated with the strategy and the degree of remaining risk after taking the action. This is essentially a qualitative benefit-cost analysis. Once a strategy is selected, the Project Manager and team need to update the scope, project cost, and schedule. The strategy needs to be monitored throughout the project to ensure the strategy is in fact effective in mitigating the risk.

References

CALTRANS

Caltrans Method for Risk Analysis

Step 1. Assign Probability Ranking: Assign a probability ranking of one to five to each identified risk. Figure 6, **Risk Probability Rankings**, provides some definitions may be helpful in this process.

Figure 6
Risk Probablity Ranking

Ranking	Probability of Risk Event
1	80 – 99%
2	60 – 79%
3	40 – 59%
4	20 – 39%
5	1 – 19%

Step 2: Assign Impact Ranking: Impacts are the consequences of a risk, if the risk should occur. Figure 7, **Risk Probability Ranking**, can be used to assign impact rankings to risks, based on potential impacts to each of the project goals.

Figure 7
Risk Impact Considerations

Project Goal	Impact Ranking				
	1	2	3	4	5
Objective	Insignificant changes in project objectives	Changes in project scope are necessary	Significant changes in project scope are necessary	Stakeholders' objectives not fully met	Purpose and need of the project is jeopardized
Schedule	Insignificant Schedule slippage	Slippage of milestone by less than one month	Slippage of milestone by one to two months	Slippage of milestone by two to three month	Slippage of milestone by more than one quarter
Budget	Insignificant cost increase	Less that 5% increase	5 – 10% increase	10 – 20% increase	Greater than 20% increase
Quality	Insignificant effects on quality	Quality problems will cause significant management attention	Quality problems will cause budget and/or schedule slippage	Quality problems will effect project objective	Major re-work will be required, effecting all other project goals

If a risk impacts more than one project goal it may be appropriate to assign one ranking higher. For instance, if a risk will result in schedule slippage of one to two months and a budget increase of less than 5%, an appropriate ranking may be 4.

Step 3: Determine Risk Priority Group: The third step is to combine the data from the previous steps to arrive at a risk priority grouping. **Figure 8**, Risk Impact Considerations, combines probability and impact rankings.

Each risk is assigned a priority group, which reflects both probability of the risk occurring and the impact, if it should occur. All risks are then assigned to one of three groups:

- Group A: High Priority Risks
- Group B: Intermediate Priority Risks
- Group C: Low Priority Risks

Figure 8
Risk Priority Groups

Impact Rankings	Probability Rankings				
	1	2	3	4	5
1	C	C	C	C	C
2	C	C	B	B	B
3	C	B	B	A	A
4	B	B	A	A	A
5	B	A	A	A	A

Risk Response: Risk response planning should focus on the high priority risks (Group A) initially and intermediate priority risks (Group B) as time and resources permit. Low priority risks are usually considered acceptable risks and are not usually addressed in a risk response plan.

A risk response plan should assign one of the following strategies to each risk considered.

- Avoid the Risk
- Transfer the Risk
- Mitigate the Risk
- Accept the Risk
- Select a Strategy

Risk Management Plan: A risk management plan should identify the risks that need to be managed (those in Group A and possible some or all of Group B) and the selected risk response strategy for each. The plan should include specific actions to be taken and responsible parties.

Example of the Risk Management Process: An FDOT Project Manager has been assigned a highway design project to manage. This project is the widening of four miles of a rural two-lane highway to a four-lane divide highway with at-grade signalized intersections. A PD&E project has been completed. This project will be designed by a consultant. The scope of services for the consultant contract has not yet been finalized.

The following risks are identified:

- PD&E report is in error

- Right of way studies are in error
- Local communities will pose objections
- Delay in railroad agreement
- Delay in permit approvals
- Unanticipated Project Manager workload
- Selection of an inexperienced consultant
- A very aggressive schedule

Risk probability and impact rankings are assigned using the following matrix, Figure 9, **Risk Priorities**.

Figure 9
Risk Priorities

Risk	Probability Ranking	Impact Ranking	Priority Group
PD&E report is in error	2	2	C
Right of way studies are in error	1	4	C
Local communities will pose objections	4	5	A
Delay in railroad agreement	4	3	A
Unanticipated Project Manager workload	4	4	A
Selection of an inexperienced consultant	2	4	B
Aggressive schedule	1	4	C

A risk management plan based on the risk priorities above might consist of the following actions, as illustrated in Figure 10, **Risk Response Plan**.

Figure 10
Risk Response Plan

Risk	Response
High Priority Risks:	
Local communities will pose objections	Include a well-prepared community action plan in the consultant scope and ensure consultant devotes adequate staff in negotiations.
Delay in railroad agreement	Begin negotiations with railroad early in the project and ensure adequate consultant support is available.
Unanticipated Project Manager workload	Request that an assistant P.M. be assigned to the project. Work closely with Professional Services to ensure the consultant selection process results in a consultant that can be expected to produce with minimum oversight by the FDOT Project Manager.
Intermediate Priority Risks:	
Selection of an inexperienced consultant	Actions taken in above response will mitigate this risk.
Aggressive schedule	Review schedule prior to finalizing consultant scope and revise if necessary.